CLAIMS

1. Oxygen conducting membrane comprising a mixed conducting dense membrane of multimetal oxide, one of the surfaces of which is covered with dispersed particles based on magnesium oxide or noble metals.

2. Membrane according to claim 1, in which the particles based on magnesium oxide and/or noble metals have a diameter of between 5 and 3000 nm.

3. Membrane according to either claim 1 or claim 2, in which the dense mixed conducting membrane of multimetal oxide has a perovskite structure.

4. Membrane according to any one of claims 1 to 3, in which the dense mixed conducting layer comprises one or more multimetal oxides which comply with the general formula :

$$A_{1-x}\,A'_{x}\,B_{1-y}\,B'_{y}\,O_{3-z}$$

where

A and A', which may be the same or different, each represent a metal ion or an alkaline-earth metal or a metal which is selected from the lanthanide series;

B and B', which may be the same or different, each represent a metal ion and/or a mixture of metal ions in which the metal is selected from the transition metals;

$0 \leq x \leq 1;$

$0 \leq y \leq 1;$

z is a number which renders the charge of the compound neutral and which defines the oxygen deficiency.

5. Membrane according to claim 4, in which A and A', which may be the same or different, represent La, Ca, Sr, and/or Ba.

6. Membrane according to either claim 4 or claim 5, in which B and B', which may be the same or different, are selected from Cr, Mn, Fe, Co, Ni and/or Cu.

7. Membrane according to any one of claims 4 to 6, in which the dense mixed conducting layer comprises multimetal oxide having the formula:

$$Ba_x\ Sr_{1-x}\ Co_{1-y}\ Fe_y\ O_{3-z}$$

where x, y and z are as defined in claim 6.

8. Membrane according to claim 7, in which the multimetal oxide comprises $Ba_{0.5}\ Sr_{0.5}\ Co_{0.8}\ Fe_{0.2}\ O_{3-z}$.

9. Membrane according to any one of the preceding claims, in which the dense mixed conducting membrane of multimetal oxide has a thickness of between 0.5 and 10 mm.

10. Membrane according to any one of the preceding claims, in which the particles based on magnesium oxide or noble metals represent from 0.01 to 0.1% by weight of the dense membrane.

11. Membrane according to any one of the preceding claims, in which the particles are based on magnesium oxide.

12. Membrane according to claim 11, in which the particles based on magnesium oxide are doped using vanadium.

13. Membrane according to any one of claims 1 to 10, in which the particles are particles of noble metals or alloys thereof.

14. Membrane according to claim 13, in which the noble metals are selected from Pd, Pt, Rh, Ag, Au, Ru and Ir.

15. Method for preparing oxygen conducting membranes as defined according to claims 1 to 12, comprising the steps consisting in:
a. providing a dense mixed conduction membrane as defined in claims 1 and 3 to 9;
b. preparing a colloidal suspension based on magnesium oxide in an organic solvent;
c. placing the suspension obtained in contact with the dense mixed conducting membrane; and
d. calcining the membrane obtained.

16. Method for preparing oxygen conducting membranes as defined according to claims 1 to 10 and 13 to 14, comprising the steps consisting in:
a. providing a dense membrane of multimetal oxide as defined in claims 1 and 3 to 9;
b. depositing the particles of noble metals or alloys thereof by means of laser vaporisation.

17. Oxygen conducting membrane which can be obtained using the method according to either claim 15 or claim 16.

18. Membrane reactor comprising an oxidation zone and a reduction zone which are separated by means of an oxygen conducting membrane as defined in any one of claims 1 to 14 or 17.

19. Membrane reactor according to claim 18, in which the oxidation zone is in contact with the surface of the membrane

coated with dispersed particles based on magnesium oxide or noble metals.

20. Method for oxidising a reactant gas comprising:
i) using a membrane reactor according to claims 18 or 19;
ii) introducing the reactant gas into the oxidation zone;
iii) introducing the gas containing oxygen into the reduction zone;
iv) heating the membrane which separates the oxidation and reduction zones to an operating temperature.

21. Method according to claim 20, in which the reactant gas is a light hydrocarbon which is oxidised into alkene.

22. Method according to claim 21, in which the light hydrocarbon is ethane which is oxidised into ethylene.

23. Use of a membrane reactor according to claims 18 or 19 to recover oxygen from a gaseous mixture containing oxygen.